GPIB

Getting Started with Your PXI-GPIB or PMC-GPIB and the GPIB Software for Windows NT

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Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notices to User: ***Changes or modifications not expressly approved by National Instruments could void the user's authority to operate the equipment under the FCC Rules.***

This device complies with the FCC rules only if used with shielded interface cables of suitable quality and construction. National Instruments used such cables to test this device and provides them for sale to the user. The use of inferior or nonshielded interface cables could void the user's authority to operate the equipment under the FCC rules.

If necessary, consult National Instruments or an experienced radio/television technician for additional suggestions. The following booklet prepared by the FCC may also be helpful: *Interference to Home Electronic Entertainment Equipment Handbook.* This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

Canadian Department of Communications

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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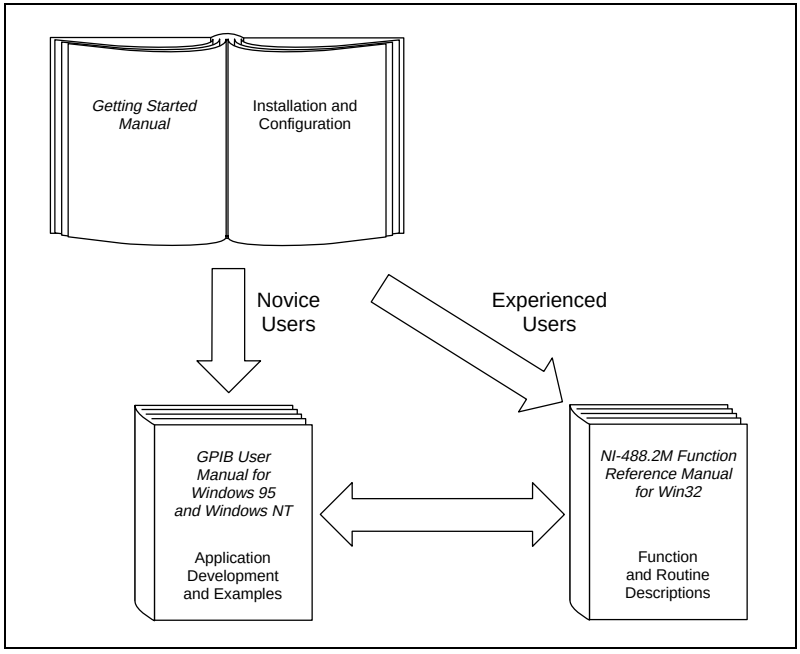
About This Manual

This manual contains instructions for installing and configuring the National Instruments PXI-GPIB or PMC-GPIB interface and the GPIB software for Windows NT. The GPIB software is intended for use with Windows NT version 4.0 or higher.

This manual assumes that you are already familiar with Windows NT.

How to Use the Manual Set


Getting Started Manual
Installation and Configuration
Novice Users
Experienced Users
GPIB User Manual for Windows 95 and Windows NT
Application Development and Examples
NI-488.2M Function Reference Manual for Win32
Function and Routine Descriptions

Use this getting started manual to install and configure your GPIB board and the GPIB software for Windows NT.

Use the *GPIB User Manual for Windows 95 and Windows NT* to learn the basics of GPIB and how to develop an application program. This manual also contains application examples and troubleshooting information.

The *NI-488.2M Function Reference Manual for Win32* contains specific NI-488 function and NI-488.2 routine information, such as format, parameters, and possible errors.

Organization of This Manual

The *Getting Started with Your PXI-GPIB or PMC-GPIB and the GPIB Software for Windows NT* manual is organized as follows:

- Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started, and briefly describes the GPIB hardware and software.
- Chapter 2, *Installation and Configuration*, describes how to install and configure your PXI-GPIB or PMC-GPIB and the GPIB software for Windows NT.
- Chapter 3, *Verify the Installation*, describes how to verify the hardware and software installation.
- Chapter 4, *Begin to Use the GPIB Software*, helps you get started with the GPIB software for Windows NT.
- Appendix A, *Uninstalling the Hardware and Software*, describes how to uninstall your PXI-GPIB or PMC-GPIB and the GPIB software from Windows NT.
- Appendix B, *Troubleshooting and Common Questions*, describes how to troubleshoot and answers some common questions.
- Appendix C, *Specifications*, describes the electrical, physical, and environmental characteristics of the PXI-GPIB and PMC-GPIB, transfer rates of the GPIB software, and the recommended operating conditions.
- Appendix D, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and description of terms that appear in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.

Conventions Used in This Manual

The following conventions are used in this manual:

» The **»** symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.

This icon to the left of bold italicized text denotes a warning, which advises you of precautions to take to avoid being electrically shocked.

bold Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows 95 tabs, or LEDs.

bold italic Bold italic text denotes an activity objective, note, caution, or warning.

IEEE 488 and IEEE 488.2 IEEE 488 and IEEE 488.2 refer to the ANSI/IEEE Standard 488.1-1987 and the ANSI/IEEE Standard 488.2-1992, respectively, which define the GPIB.

italic Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text from which you supply the appropriate word or value, as in Windows 3.*x*.

`monospace` Text in this font denotes text or characters that you should literally enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and for statements and comments taken from programs.

`monospace bold` Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also emphasizes lines of code that are different from the other examples.

Related Documentation

The following documents contain information that you may find helpful as you read this manual:

- ANSI/IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*
- ANSI/IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols, and Common Commands*
- *Microsoft Windows NT System Guide*, Microsoft Corporation

Customer Communication

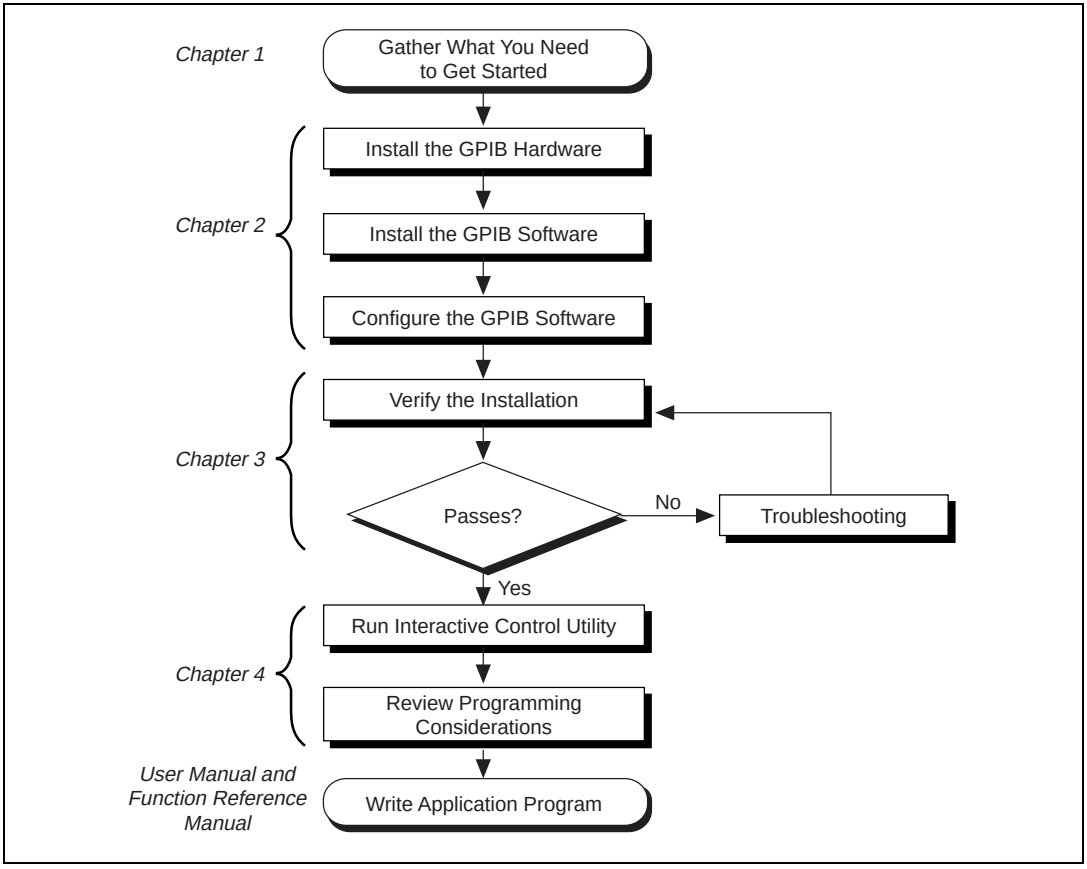
National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix D, *Customer Communication*, at the end of this manual.

Chapter 1

Introduction

This chapter explains how to use this manual, lists what you need to get started, and briefly describes the GPIB hardware and software.

How to Use This Manual



What You Need to Get Started

Make sure you have all of the following items before you install your GPIB hardware and software for Windows NT:

- ❑ PXI-GPIB or PMC-GPIB board, which your kit contains
- ❑ The following 3.5 in., high density (1.44 MB) disks, which your kit contains:

  GPIB Software for Windows NT (Disk 1 of 2)

  GPIB Software for Windows NT (Disk 2 of 2)
- ❑ GPIB cable for the PXI-GPIB—single-shielded or double-shielded, Type X1, X2, X4, X5, or X11, which you can order from National Instruments

  or

  GPIB cable for the PMC-GPIB—Type X13, which is included in your kit
- ❑ Windows NT version 4.0 or higher installed on your system

Optional Equipment

Call National Instruments for more information about the following optional equipment:

- Serial or parallel bus extender and cables
- Bus expander/isolator

GPIB Hardware Overview

The Plug and Play GPIB hardware, along with the GPIB software, transforms your system into a fully functional GPIB Talker/Listener/Controller that has complete communications and bus management capability. The TNT4882C chip on each Plug and Play GPIB board combines the circuitry of the NAT4882 ASIC, the Turbo488 ASIC, and GPIB transceivers to create a single-chip IEEE 488.2 interface. The TNT4882C also implements the HS488 high-speed protocol, which increases the maximum data transfer rate to up to 7.8 Mbytes/s, depending on the system and the system configuration. For more information about transfer rates, refer to Appendix C, *Specifications*, in this manual. For

more information about HS488, refer to Chapter 7, *GPIB Programming Techniques*, in the *GPIB User Manual for Windows 95 and Windows NT*.

The PXI-GPIB and PMC-GPIB each contain one GPIB load; you can connect up to 14 instruments to one of these interfaces. If you want to use more instruments, you can order a bus extender or expander from National Instruments. Refer to Appendix C, *Specifications*, for more information about the GPIB hardware specifications and operating conditions.

GPIB Software Overview

The GPIB software for Windows NT includes a loadable Windows NT kernel device driver and supporting utilities.

The GPIB software includes the following components:

- Device driver
- Diagnostic test utility
- Configuration utility
- Utilities for software development and debugging
- Language interface libraries for Microsoft Visual C/C++ 2.0 or later, Borland C/C++ 4.0 or later, and Microsoft Visual Basic 4.0 or later
- Virtual device driver and special DOS and Windows 3 drivers for running existing NI-488.2 for DOS and Windows 3 applications under Windows NT
- Example programs that use NI-488 functions and NI-488.2 routines

For a detailed list of files, refer to Chapter 1, *Introduction*, in the *GPIB User Manual for Windows 95 and Windows NT*. Refer to Appendix C, *Specifications*, for information about the GPIB software transfer rates.

Time-Saving Development Tools

Your kit includes the GPIB software for Windows NT. In addition, you can order the LabWindows/CVI or LabVIEW software from National Instruments to speed your application development time and make it easier to communicate with your instruments.

LabVIEW is an easy-to-use, graphical programming environment you can use to acquire data from thousands of different instruments, including IEEE 488.2 devices, VXI devices, serial devices, PLCs, and plug-in data acquisition boards. After you have acquired raw data, you can convert it into meaningful results using the powerful data analysis routines in LabVIEW. LabVIEW also comes with hundreds of instrument drivers, which dramatically reduce software development time, because you do not have to spend time programming the low-level control of each instrument.

LabWindows/CVI is similar to LabVIEW, except that it combines an interactive, easy-to-use development approach with the programming power and flexibility of compiled ANSI C code.

For ordering information, or to request free demonstration software, contact National Instruments.

Installation and Configuration

Chapter 2

This chapter describes how to install and configure your PXI-GPIB or PMC-GPIB and the GPIB software for Windows NT.

Install the Hardware

This section describes how to install your GPIB hardware. Refer to the section that describes the installation for your particular board.

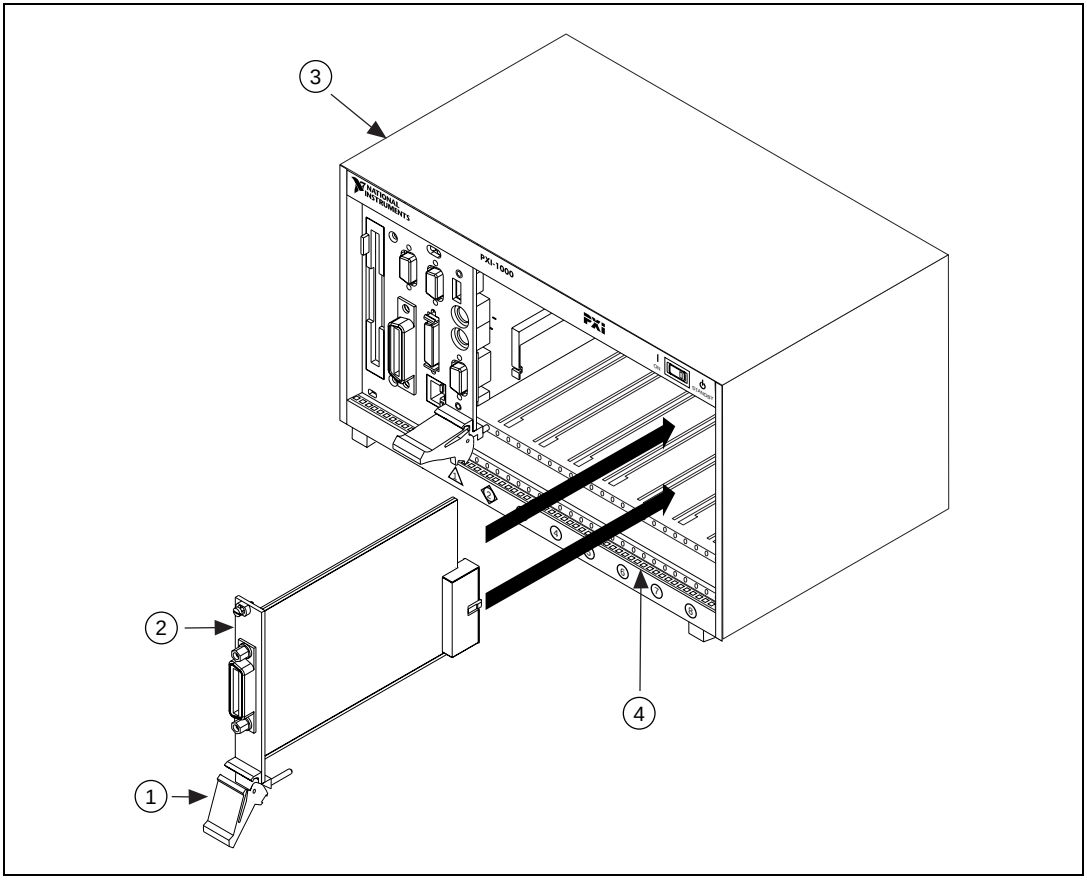
Install the PXI-GPIB

Warning ***Electrostatic discharge can damage several components on these GPIB boards. To avoid electrostatic damage when you handle the board, touch the antistatic plastic package to a metal part of your system chassis before removing the board from the package.***

Complete the following steps to install your PXI-GPIB:

1. Make sure that your PXI or CompactPCI chassis is turned off. Keep the PXI or CompactPCI chassis plugged in so that it remains grounded while you install the PXI-GPIB.
2. Choose an unused PXI or CompactPCI 5 V peripheral slot. For maximum performance, the PXI-GPIB has an onboard DMA controller that can only be used if the board is installed in a slot that supports bus arbitration, or bus master cards. National Instruments recommends installing the PXI-GPIB in such a slot. If you install the board in a non-master slot, you must disable the PXI-GPIB onboard DMA controller using the board-level call `ibdma`. Refer to the *NI-488.2 Function Reference Manual for Win32* for a complete description of `ibdma`.
3. Remove the filler panel for the peripheral slot you have chosen.
4. Touch a metal part on your chassis to discharge any static electricity that might be on your clothes or body.

5. Insert the PXI-GPIB into the selected 5 V slot. Use the injector/ejector handle to fully inject the device into place. Figure 2-1 shows how to install the PXI-GPIB into a PXI or CompactPCI chassis.



1	Injector/Ejector Handle (In Down Position)	3	PXI Chassis
2	PXI-GPIB Board	4	Injector/Ejector Rail

Figure 2-1. Installing the PXI-GPIB

6. Screw the front panel of the PXI-GPIB to the front panel mounting rail of the PXI or CompactPCI chassis.
7. Turn on your PXI or CompactPCI chassis and start Windows NT.

The PXI-GPIB installation is now complete. Proceed to the *Install the GPIB Software* section, later in this chapter.

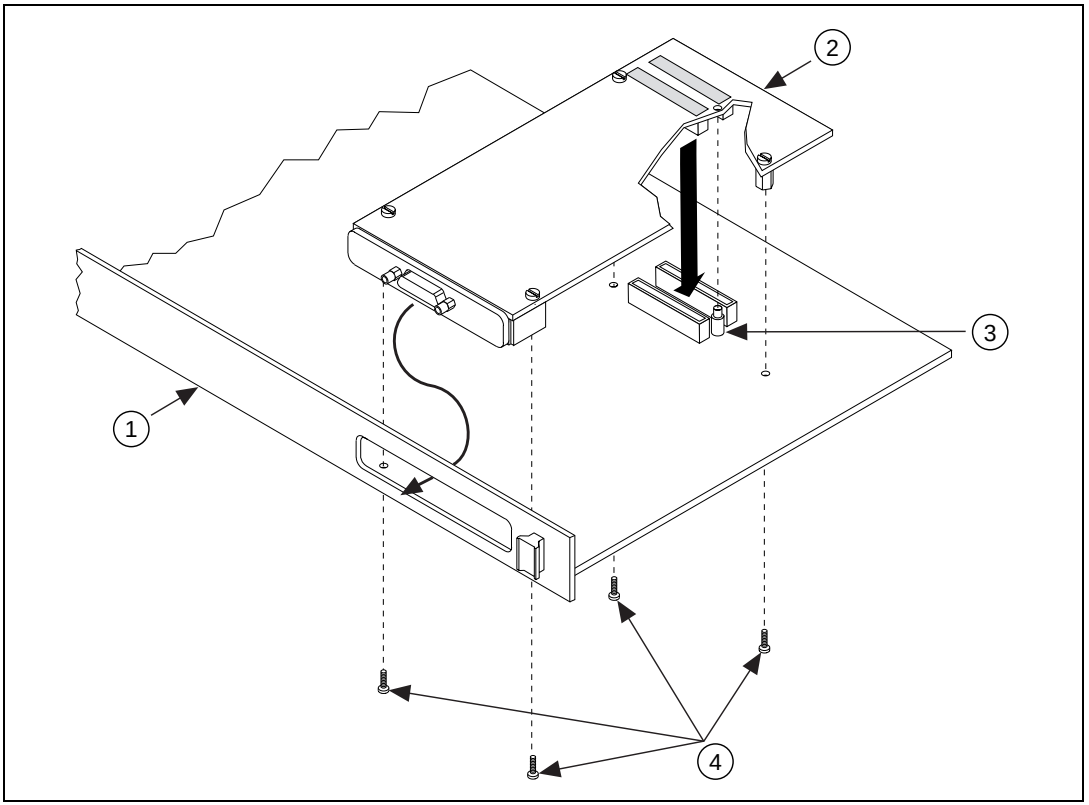
Install the PMC-GPIB

Warning ***Electrostatic discharge can damage several components on these GPIB boards. To avoid electrostatic damage when you handle the board, touch the antistatic plastic package to a metal part of your system chassis before removing the board from the package.***

Complete the following steps to install your PMC-GPIB:

1. Turn off your system.
2. Find an unused PMC slot in your system. You may need to remove the host from the system to access the PMC slot.
3. Remove the corresponding slot filler panel from the host.

4. Insert the PMC-GPIB into the slot as shown in Figure 2-2. It might be a tight fit, but do not force the board into place.



1	Host Face Plate	3	+5 V Voltage Key
2	PMC-GPIB Board	4	Mounting Screws

Figure 2-2. Installing the PMC-GPIB

5. Use the mounting hardware provided to fasten the PMC-GPIB to the host.
6. Reinstall the host, if you removed it to install the PMC-GPIB.
7. Turn on your system and start Windows NT.

The PMC-GPIB hardware installation is now complete. Proceed to the next section, *Install the GPIB Software*.

Install the GPIB Software

After you have installed and configured your GPIB hardware, you are ready to install the GPIB software. Complete the following steps to run the software installation program:

1. Log onto your Windows NT system using the `Administrator` account. The GPIB setup program must have `Administrator` privileges because the program modifies the configuration registry of your system.
2. Insert the *GPIB Software for Windows NT (Disk 1 of 2)* into an unused drive.
3. Select **Run...** from the **Start** menu.
4. Type the following command in the dialog box:

   x`:\setup`

   where *x* is the letter of the drive containing the distribution disk (usually `a` or `b`).

   The software installation begins with the dialog box shown in Figure 2-3. Although the PXI-GPIB and PMC-GPIB are not listed in this dialog box, they are compatible with the PCI-GPIB.

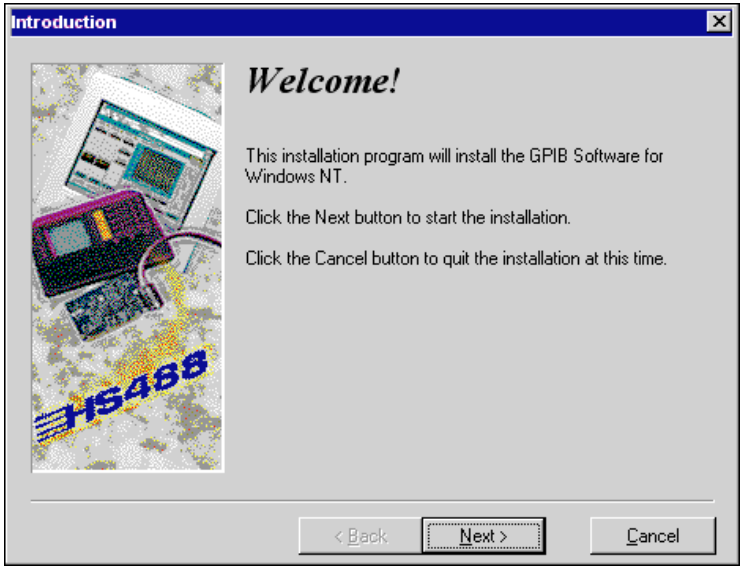

Introduction
Welcome!
This installation program will install the GPIB Software for Windows NT.
Click the Next button to start the installation.
Click the Cancel button to quit the installation at this time.
HS488
< Back
Next >
Cancel

Figure 2-3. GPIB Software for Windows NT Setup Dialog Box

The setup wizard guides you through the necessary steps to install the GPIB software. To go back and change values where appropriate, click on the **Back** button. To exit the setup program at any time, click on the **Cancel** button.

Before you use the GPIB software with your PXI-GPIB or PMC-GPIB, you must reconfigure the software. Refer to the next section, *Configure the GPIB Software*, for instructions on how to run the GPIB Configuration utility.

Configure the GPIB Software

The GPIB Configuration utility is an interactive utility you can use to examine or modify the configuration of the GPIB driver.

Complete the following steps to run the GPIB Configuration utility:

1. Select **Start»Settings»Control Panel** and double-click on the **GPIB** icon.

   The GPIB Configuration utility displays a list of all the GPIB boards and device names.

2. In the **GPIB Configuration** dialog box, select a GPIB interface from the **GPIB Board** list. If you are using only one GPIB interface, select **GPIB0**.
3. Click on the **Board Type** button. The PXI-GPIB and PMC-GPIB are compatible with the PCI-GPIB, so select **PCI-GPIB** from the list that appears. Click on the **OK** button.

4. Configure your PXI-GPIB or PMC-GPIB interface:
   a. Click on the **Configure** button to bring up the **PCI-GPIB Configuration** dialog box, as shown in Figure 2-4.

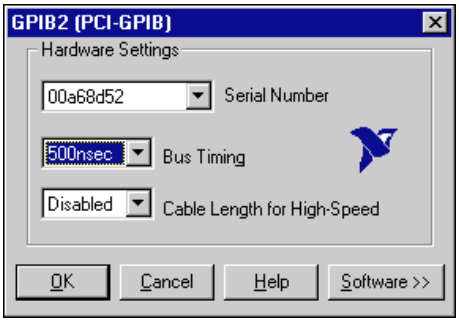


Figure 2-4. PCI-GPIB Configuration Dialog Box

   b. In the **Serial Number** drop-down list, select the appropriate serial number.
   c. Click on the **OK** button.
   d. In the **GPIB Configuration** dialog box, click on the **OK** button to save your changes and exit the utility.
   e. In the **Restart the GPIB Software?** dialog box, click on the **Yes** button.
5. (Optional) Configure the GPIB software settings:
   a. Select **Start»Settings»Control Panel** and double-click on the **GPIB** icon.
   b. You can configure additional items, such as the GPIB primary address or I/O timeout, but they are normally configured at run time by your application program. To examine or edit a setting, double-click on its name. You can use the online help if you have any questions. For more information about GPIB Configuration utility options, refer to the *GPIB User Manual for Windows 95 and Windows NT* or use the online help.
   c. To save your changes and exit the utility, click on the **OK** button. To discard the changes and exit the utility, click on the **Cancel** button.

After you install and configure the GPIB software, you should verify the installation. Continue to the next chapter, Chapter 3, *Verify the Installation*.

Chapter 3

Verify the Installation

This chapter describes how to verify the hardware and software installation.

You can use the Diagnostic utility, installed with your GPIB software, to test the hardware and software installation. The Diagnostic utility verifies that your hardware and software are functioning properly and that the configuration of your GPIB interfaces does not conflict with anything else in your system.

To run the Diagnostic utility, select the **Diagnostic** item under **Start»Programs»GPIB Software**.

After you start the Diagnostic utility, test your GPIB interfaces by clicking on the **Test All** button. If the Diagnostic utility test is successful, it puts a checkmark next to the interface and changes its status from **untested** to **passed**. If the Diagnostic utility test fails, it puts an X next to the interface, and changes its status from **untested** to **failed**. Figure 3-1 shows the **Diagnostic** dialog box after it has tested some GPIB interfaces. The PXI-GPIB and PMC-GPIB boards appear as **PCI-GPIB**.

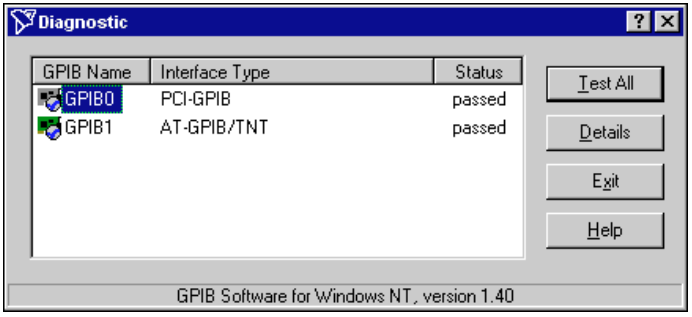


Figure 3-1. Diagnostic Utility after Testing

To get details on any of the tested GPIB interfaces, select the interface and click on the **Details** button. For each failed GPIB interface, select it and click on the **Details** button to get a description of the failure. Use that information and the information in Appendix B, *Troubleshooting and Common Questions*, to troubleshoot the problem. Troubleshooting information is also available in the Diagnostic utility online help, which you can access by clicking on the **Help** button.

Begin to Use the GPIB Software

Chapter 4

This chapter helps you get started with the GPIB software for Windows NT.

Getting Started with LabVIEW

LabVIEW is a graphical programming language in which your source code looks like a flowchart. It provides the same functionality as other programming languages when controlling GPIB instruments. If you already installed LabVIEW, you can use the LabVIEW GPIB functions without any additional installation. To learn about the basic concepts of GPIB communication, refer to the LabVIEW GPIB functions chapter in the *LabVIEW User Manual*. To learn more about each GPIB function, refer to the *LabVIEW Function and VI Overview Manual* and the online help.

National Instruments provides LabVIEW instrument drivers, which are applications that communicate to a specific GPIB instrument. LabVIEW instrument drivers eliminate the need to learn the complex, low-level programming commands for each instrument. For more information, refer to Chapter 7, *Getting Started with a LabVIEW Instrument Driver*, in the *LabVIEW User Manual*. If you want to write your own instrument driver, National Instruments provides application notes that help you get started.

To find GPIB examples similar to your application, click on the **Solution Wizard** and **Search Examples** buttons in the startup LabVIEW dialog box.

For more information about NI products, refer to our web site at `http://www.natinst.com/products/`.

Getting Started with LabWindows/CVI

If you already installed LabWindows/CVI, you can use the LabWindows/CVI GPIB Library without any additional installation. The LabWindows/CVI GPIB Library includes the functions documented in your NI-488.2 or NI-488.2M reference manual, as well as several additional functions, which are documented in the GPIB library chapter of

the *LabWindows/CVI Standard Libraries Reference Manual*. To help you use the GPIB functions, LabWindows/CVI provides function panels for the GPIB Library. To access the function panels, select **GPIB/GPIB 488.2** from the **Library** menu of the **Project** or **Source** windows. For information about using function panels, refer to the function panels chapter in the *LabWindows/CVI User Manual*.

If you need to program a GPIB instrument, you might want to use an instrument driver. An instrument driver is a set of high-level C functions for controlling a specific instrument. The low-level steps to control the instrument and read data are encapsulated in the high-level functions. You can write an instrument driver yourself, or you can use one that is already written. When you purchase LabWindows/CVI, you get free access to a library of drivers for hundreds of instruments. For more information about instrument drivers, refer to the project window chapter in the *LabWindows/CVI User Manual*.

For more information about NI products, please refer to our web site at `http://www.natinst.com/products/`.

Introduction to the Win32 Interactive Control Utility

You can use the interactive control utility to enter NI-488 functions and NI-488.2 routines interactively and see the values returned by the function calls. You can use this utility to do the following:

- Verify GPIB communication with your device quickly and easily.
- Learn the NI-488 functions and NI-488.2 routines before you write your application.
- Become familiar with the commands of your device.
- Receive data from your GPIB device.
- Troubleshoot problems with your application.

To run the Win32 Interactive Control utility, select the **Win32 Interactive Control** item under **Start»Programs»GPIB Software**.

This utility includes extensive online help, which you can access by entering `help` at the `:` prompt. For more information about the Win32 Interactive Control utility, refer to the *GPIB User Manual for Windows 95 and Windows NT.*

Introduction to the NI Spy Utility

Included with the GPIB software is NI Spy, a Win32 utility that monitors and records multiple National Instruments APIs (for example, NI-488.2 and VISA). You can use NI Spy to monitor Win32, Win16, and DOS GPIB applications. Use NI Spy to do the following:

- Capture information about NI-488 functions and NI-488.2 routines as your GPIB applications invoke them.
- Display captured information, including, but not limited to, input and output parameter values, I/O buffer contents, and return values.
- Save, restore, and print captured information.

To run NI Spy, select the **NI Spy** item under **Start»Programs»GPIB Software**.

For more information about the NI Spy utility, refer to Chapter 5, *NI Spy Utility*, in the *GPIB User Manual for Windows 95 and Windows NT*, or use its built-in, context-sensitive online help.

Running Existing GPIB Applications

You can run existing Win32, Win16, and DOS GPIB applications under Windows NT.

Win32 and Win16 GPIB applications run without any special modifications. To run an existing DOS GPIB application, complete the following steps.

Load the special GPIB device driver `gpib-nt.com` instead of `gpib.com`, which you normally use with DOS. When you install the GPIB software, the GPIB setup program copies `gpib-nt.com` into a new subdirectory called `doswin16`. To use `gpib-nt.com`, you must modify your `config.nt` file to load `gpib-nt.com` whenever a DOS application runs. The `config.nt` file is located in your *`winnt`*`\system32` directory, where *`winnt`* is your Windows NT directory, for example, `c:\windows`. The GPIB setup program modifies the `config.nt` file by adding the following lines:

```
REM *** To run DOS GPIB applications, uncomment the
REM *** following line
REM device=path\doswin16\gpib-nt.com
```

where *path* is the directory in which you installed the GPIB software.

To load `gpib-nt.com`, locate these lines in your `config.nt` file and delete `REM` from the third line, as follows:

```
REM *** To run DOS GPIB applications, uncomment the
REM *** following line
device=path\doswin16\gpib-nt.com
```

where *path* is the directory in which you installed the GPIB software.

General Programming Considerations

As you begin developing your Win32 GPIB application, remember the following points:

- For your C/C++ application, you must include the NI-488.2M header file, `decl-32.h`, in your source code.
- You can access the GPIB software through the 32-bit DLL, `gpib-32.dll`, either by linking with one of the language interfaces provided with the GPIB software, or by using direct DLL entry from other programming environments.
- Several sample GPIB applications are included with the GPIB software. Use these as a guide for your own application development.

For information about choosing a programming method, developing your application, or compiling and linking, refer to the *GPIB User Manual for Windows 95 and Windows NT*. For detailed information about each NI-488 function and NI-488.2 routine, refer to the *NI-488.2M Function Reference Manual for Win32* or the online help.

Uninstalling the Hardware and Software

Appendix A

This appendix describes how to uninstall your PXI-GPIB or PMC-GPIB and the GPIB software from Windows NT.

Uninstalling the Hardware

Before you physically remove the GPIB hardware from your system, you must remove the hardware information using the GPIB Configuration utility. Complete the following steps to remove the hardware information:

1. Select **Start»Settings»Control Panel** and double-click on the **GPIB** icon.
2. In the **GPIB Configuration** dialog box, select the GPIB interface you want to remove from the **GPIB Board** list.
3. Click on the **Board Type** button and select **None** from the list that appears, as shown in Figure A-1. Click on the **OK** button to save the new **Board Type** setting.

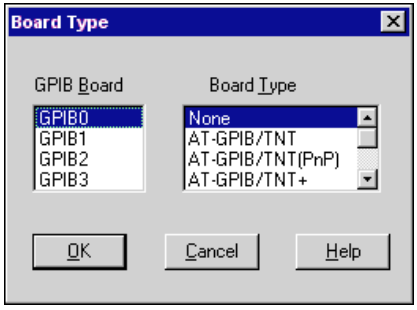


Figure A-1. Board Type Dialog Box

4. Click on the **OK** button to save your changes and exit the GPIB Configuration utility.
5. Shut down Windows NT, turn off your system, and physically remove the interface from your system.

Uninstalling the Software

Before you uninstall the GPIB software, you should set the **Board Type** for your GPIB interface(s) to **None** in the GPIB Configuration utility, as described in the previous section. Complete the following steps to uninstall the GPIB software:

1. Select **Start»Settings»Control Panel** and double-click on the **Add/Remove Programs** icon. The dialog box shown in Figure A-2 lists the software available for removal.

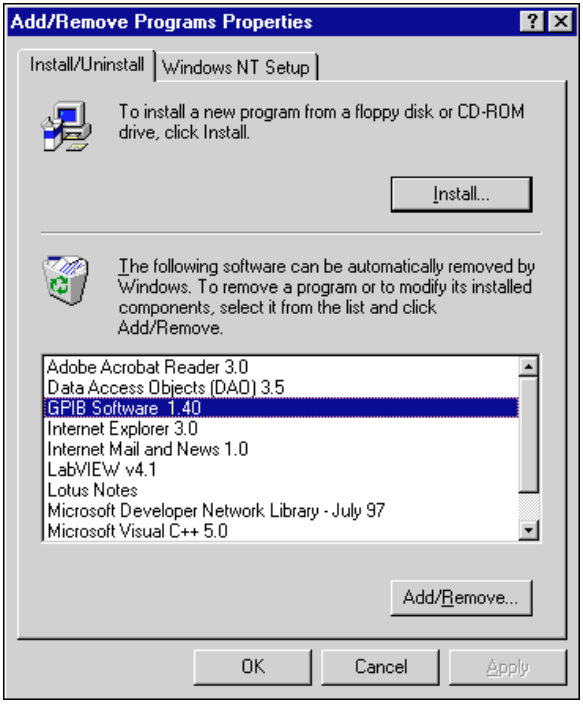

Add/Remove Programs Properties
Install/Uninstall
Windows NT Setup
To install a new program from a floppy disk or CD-ROM drive, click Install.
Install...
The following software can be automatically removed by Windows. To remove a program or to modify its installed components, select it from the list and click Add/Remove.
Adobe Acrobat Reader 3.0
Data Access Objects (DAO) 3.5
GPIB Software 1.40
Internet Explorer 3.0
Internet Mail and News 1.0
LabVIEW v4.1
Lotus Notes
Microsoft Developer Network Library - July 97
Microsoft Visual C++ 5.0
Add/Remove...
OK
Cancel
Apply

Figure A-2. Add/Remove Programs Properties Dialog Box

2. Select the GPIB software you want to remove and click on the **Add/Remove…** button. The uninstall program removes all folders, programs, DLLs, and registry entries associated with the GPIB software. During uninstallation, you are prompted about deleting shared components, as shown in Figure A-3. Click on **Yes**, **No**, or **No to All** to continue with the uninstallation.

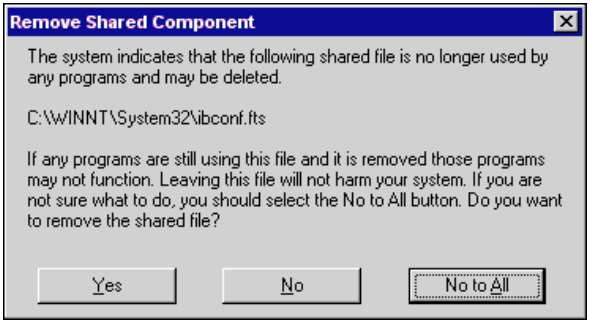

Remove Shared Component
The system indicates that the following shared file is no longer used by any programs and may be deleted.
C:\WINNT\System32\ibconf.fts
If any programs are still using this file and it is removed those programs may not function. Leaving this file will not harm your system. If you are not sure what to do, you should select the No to All button. Do you want to remove the shared file?
Yes
No
No to All

Figure A-3. Removed Shared Component Dialog Box

If you have not physically removed your hardware, shut down Windows NT, turn off your system, and remove the GPIB hardware.

The uninstall program removes only items that the GPIB setup program installed. If you add anything to a directory created by the GPIB setup program, the uninstall program does not delete that directory. You need to remove any remaining components yourself.

If you want to reinstall the GPIB hardware and software, refer to Chapter 2, *Installation and Configuration*.

Troubleshooting and Common Questions

Appendix
B

This appendix describes how to troubleshoot and answers some common questions.

Troubleshooting Diagnostic Utility Failures

The following sections explain common error messages generated by the Diagnostic utility.

Missing Software Components

This error occurs if the software components that are necessary for the GPIB Software for Windows NT to function correctly are not present in the system. If you encounter this problem, reinstall the GPIB Software for Windows NT and run the Diagnostic utility again.

No GPIB Interfaces Present

This error occurs if there are no GPIB interfaces physically present in the system or there is a resource conflict with the interfaces that are installed. If you encounter this problem, use the GPIB Configuration utility to examine the installed GPIB interfaces and the resources assigned to each. Then, run the Diagnostic utility again.

To access this information in the GPIB Configuration utility, complete the following steps:

1. Select **Start»Settings»Control Panel** and double-click on the **GPIB** icon.
2. Click on the **Board Type** button and verify that the type of GPIB interface listed for each logical board name is correct. Click on the **OK** button to return to the main dialog box.
3. Double-click on each board name and verify that the hardware settings displayed in the dialog box match your actual hardware settings.

GPIB Cables Need To Be Disconnected

This error occurs if you have any GPIB cables connected to the GPIB interface. Disconnect all GPIB cables and run the Diagnostic utility again.

Address Resource Conflict

This error occurs if the address resources assigned to a GPIB interface conflict with the address resources being used by other devices in the system. To resolve an address resource conflict, refer to the *Resolving Resource Conflicts* section later in this appendix. After you have resolved the conflict, run the Diagnostic utility again.

Interrupt Resource Conflict

This error occurs if the interrupt resources assigned to a GPIB interface conflict with the interrupt resources being used by other devices in the system. To resolve an interrupt resource conflict, refer to the *Resolving Resource Conflicts* section later in this appendix. After you have resolved the conflict, run the Diagnostic utility again.

GPIB Software Problem Encountered

This error occurs if the Diagnostic utility detects that it is unable to communicate correctly with the GPIB hardware using the installed GPIB software. If you encounter this error, shut down your system, restart it, and run the Diagnostic utility again. If the problem persists, reinstall the GPIB software for Windows NT.

Unknown Problem Encountered

This error occurs if an unknown problem is encountered when you try to execute the Diagnostic utility. If this error occurs, shut down your system, restart it, and run the Diagnostic utility again. If the problem persists, reinstall the GPIB software for Windows NT.

Resolving Resource Conflicts

Resource conflicts occur when your system contains hardware that is configured to use the same resources as your GPIB interface. The GPIB driver detects some resource conflicts when it loads. When the driver detects conflicts as it loads, it records an error message describing the conflict. You can use the Event Viewer, as described in the following section, *Using Windows NT Diagnostic Tools*, to see which resource is in conflict.

Once you have identified the resource that caused the conflict, use the GPIB Configuration utility to reconfigure your GPIB interface so that it uses conflict-free resources. To help in the selection of conflict-free resources, Microsoft has provided a utility called Windows NT Diagnostics. This utility displays a list of the I/O port addresses, interrupt levels, and DMA channels that your system is currently using. You can assign resources not listed by this utility to your GPIB interface.

To run the Windows NT Diagnostics utility, select **Start»Programs»Administrative Tools»Windows NT Diagnostics**.

Using Windows NT Diagnostic Tools

There are many reasons why the GPIB driver might not load. If the software is not properly installed or if there is a conflict between the GPIB hardware and the other hardware in the system, the GPIB driver fails to start. Two Windows NT utilities are useful in determining the source of the problem: the Devices applet in the Control Panel, and the Event Viewer. The following sections describe the information available through each utility.

Examining NT Devices To Verify the GPIB Installation

To verify whether the GPIB devices are installed correctly (that is, that the devices are started), select **Start»Settings»Control Panel** and double-click on the **Devices** icon.

This utility lists all of the devices detected by Windows NT. Each device has a status associated with it. If the GPIB driver is installed correctly, the following lines appear in the list of Windows NT devices:

Device	Status	Started
GPIB Board Class Driver	Started	Automatic
GPIB Device Class Driver	Started	Automatic

You should also see one or more lines similar to the following:

Device	Status	Started
GPIB Port Driver (PCI-GPIB)	****	System

The GPIB Board Class Driver, the GPIB Device Class Driver, and at least one of the GPIB Port Drivers listed by the Devices applet should have a status of **Started**. If not, refer to the next section, *Examining the NT System Log Using the Event Viewer*.

If the GPIB Class Driver lines are not present or at least one GPIB Port Driver line is not present, the GPIB software is not installed properly. You

should reinstall the GPIB software. Refer to Chapter 2, *Installation and Configuration*, for installation instructions.

Examining the NT System Log Using the Event Viewer

Windows NT maintains a system log. If the GPIB driver is unable to start, it records entries in the system log explaining why it failed to start. To examine the system log by running the Event Viewer utility, select **Start»Programs»Administrative Tools»Event Viewer**.

Events that might appear in the system log include the following:

- The system cannot locate the device file for one or more of the devices that make up the GPIB driver and an event is logged that **`The system cannot find the file specified`**. In this case, the GPIB software is not installed properly. You should reinstall the GPIB software. Refer to Chapter 2, *Installation and Configuration*, for installation instructions.
- A conflict exists between the GPIB hardware and the other hardware in the system. If this is the case, an event is logged that indicates the nature of the resource conflict. To correct this conflict, reconfigure the GPIB hardware and software. Refer to Chapter 2, *Installation and Configuration*, for configuration information.

Common Questions

Can I use the PXI-GPIB in a slot that is not configured for bus arbitration?

National Instruments recommends installing the PXI-GPIB into a slot that supports bus arbitration, or bus master cards. But you can install the board into a non-master slot, if you disable the onboard DMA controller. Refer to the *Install the PXI-GPIB* section in Chapter 2, *Installation and Configuration*, for more information.

How can I determine which type of GPIB hardware I have installed?

Run the GPIB Configuration utility: select **Start»Settings»Control Panel** and double-click on the **GPIB** icon.

How can I determine which version of the GPIB software I have installed?

Run the Diagnostic utility: select the **Diagnostic** item under **Start»Programs»GPIB Software**. The Diagnostic utility displays the version of the GPIB software that is installed in a banner at the bottom of the window that appears.

How many GPIB interfaces can I configure for use with my GPIB software for Windows NT?

You can configure the GPIB software for Windows NT to communicate with up to four GPIB interfaces.

How many devices can I configure for use with my GPIB software for Windows NT?

The GPIB software for Windows NT provides a total of 100 logical devices for applications to use. The default number of devices is 32.

Are interrupts required with the GPIB software for Windows NT?

Yes, interrupts are required.

How can I determine if my GPIB hardware and software are installed properly?

Run the Diagnostic utility: select the **Diagnostic** item under **Start»Programs»GPIB Software**. Refer to the *Troubleshooting Diagnostic Utility Failures* section earlier in this appendix or the online help to troubleshoot any problems.

When should I use the Win32 Interactive Control utility?

You can use the Win32 Interactive Control utility to test and verify instrument communication, troubleshoot problems, and develop your application. For more information, refer to the *Introduction to the Win32 Interactive Control Utility* section in Chapter 4, *Begin to Use the GPIB Software*.

How do I use an NI-488.2M language interface?

For information about using NI-488.2M language interfaces, refer to Chapter 3, *Developing Your Application*, in the *GPIB User Manual for Windows 95 and Windows NT.*

What do I do if the Diagnostic utility fails with an error?

Use the Diagnostic utility online help, or refer to the *Troubleshooting Diagnostic Utility Failures* section earlier in this appendix. If you have already completed the troubleshooting steps, fill out the forms in Appendix D, *Customer Communication*, and contact National Instruments.

What is wrong if `ibwrt` or `ibrd` calls cause my system to hang?

If the Diagnostic utility passes, but `ibrd` or `ibwrt` calls cause your system to hang, you might have the PXI-GPIB installed in a slot that is not configured for bus arbitration. Refer to the *Install the PXI-GPIB* section in Chapter 2, *Installation and Configuration*, for more information.

How do I communicate with my instrument over the GPIB?

Refer to the documentation that came from the instrument manufacturer. The command sequences you use are totally dependent on the specific instrument. The documentation for each instrument should include the GPIB commands you need to communicate with it. In most cases, NI-488 device-level calls are sufficient for communicating with instruments. Refer to Chapter 3, *Developing Your Application*, in the *GPIB User Manual for Windows 95 and Windows NT*, for more information.

Can I use the NI-488 and NI-488.2 calls together in the same application?

Yes, you can mix NI-488 functions and NI-488.2 routines.

What can I do to check for errors in my GPIB application?

Examine the value of `ibsta` after each NI-488 or NI-488.2 call. If a call fails, the ERR bit of `ibsta` is set and an error code is stored in `iberr`. For more information about global status variables, refer to Chapter 3, *Developing Your Application,* in the *GPIB User Manual for Windows 95 and Windows NT.*

What information should I have before I call National Instruments?

When you call National Instruments, you should have the results of the Diagnostic utility test. Also, make sure you have filled out the forms in Appendix D, *Customer Communication*.

Specifications

Appendix
C

This appendix describes the electrical, physical, and environmental characteristics of the PXI-GPIB and PMC-GPIB, transfer rates of the GPIB software, and the recommended operating conditions.

Hardware Characteristics

Table C-1. Hardware Characteristics for the PXI-GPIB

Characteristic	Specification
Dimensions	100 by 160 mm (3.94 by 6.3 in.)
Power Requirement (from CompactPCI bus)	+5 VDC 600 mA Typical 800 mA Maximum
I/O Connector	IEEE 488 Standard 24-pin
Operating Environment Temperature Relative Humidity	 0° to 50° C 10% to 90%, noncondensing
Storage Environment Temperature Relative Humidity	 –20° to 70° C 5% to 95%, noncondensing
EMI	FCC Class A Verified

Table C-2. Hardware Characteristics for the PMC-GPIB

Characteristic	Specification
Dimensions	74 by 149 mm (2.9 by 5.9 in.)
Power Requirement (from PMC bus)	+5 VDC 600 mA Typical 800 mA Maximum
I/O Connector	Micro D-sub 25-pin
PCI Signaling Environment	+5 VDC
Power Dissipation	3 Watts Typical 4 Watts Maximum
Operating Environment Temperature Relative Humidity	 0° to 55° C 10% to 90%, noncondensing
Storage Environment Temperature Relative Humidity	 –20° to 70° C 5% to 95%, noncondensing
EMI	FCC Class A Verified

Software Transfer Rates

Table C-3. GPIB Software Transfer Rates for the PXI-GPIB and PMC-GPIB

GPIB Hardware	Transfer Method	Maximum GPIB Transfer Rate
PXI-GPIB	3-wire (IEEE 488)	1.5 Mbytes/s*
	High Speed (HS488)	7.8 Mbytes/s*
PMC-GPIB	3-wire (IEEE 488)	1.5 Mbyte/s*
	High Speed (HS488)	7.8 Mbyte/s*

* Actual speed may vary considerably from speed shown because of system and instrumentation capabilities.

Customer Communication

Appendix
D

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a fax-on-demand system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call 512 795 6990. You can access these services at:

United States: 512 794 5422
Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 01 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

FTP Support

To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as `anonymous` and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the `/support` directories.

Fax-on-Demand Support

Fax-on-Demand is a 24-hour information retrieval system containing a library of documents on a wide range of technical information. You can access Fax-on-Demand from a touch-tone telephone at 512 418 1111.

E-Mail Support (Currently USA Only)

You can submit technical support questions to the applications engineering team through e-mail at the Internet address listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

`support@natinst.com`

Telephone and Fax Support

National Instruments has branch offices all over the world. Use the list below to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.

Country	Telephone	Fax
Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Brazil	011 288 3336	011 288 8528
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Quebec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	09 725 725 11	09 725 725 55
France	01 48 14 24 24	01 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Israel	03 6120092	03 6120095
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	5 520 2635	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
United Kingdom	01635 523545	01635 523154
United States	512 795 8248	512 794 5678

Technical Support Form

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name _____

Company _____

Address _____

_____

Fax (___) _____Phone (___) _____

Computer brand_____ Model _____ Processor_____

Operating system (include version number) _____

Clock speed _____MHz RAM _____MB Display adapter _____

Mouse ___yes ___no Other adapters installed_____

Hard disk capacity _____MB Brand_____

Instruments used _____

_____

National Instruments hardware product model _____ Revision _____

Configuration _____

National Instruments software product _____ Version _____

Configuration _____

The problem is: _____

_____

_____

_____

_____

List any error messages: _____

_____

_____

The following steps reproduce the problem: _____

_____

_____

_____

_____

Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Complete a new copy of this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

National Instruments Products

GPIB interface type and revision _____

GPIB software for Windows NT version number on disk _____

Programming language interface version _____

Shield ground connected to logic ground (yes or no) _____

Diagnostic utility results _____

Other Products

Computer make and model _____

Microprocessor _____

Clock frequency or speed _____

Type of monitor card installed _____

Windows NT version _____

Operating system mode _____

Application programming (Microsoft C, and so on) _____

Other boards in system _____

Base I/O address of other boards _____

Interrupt level of other boards _____

DMA channels of other boards _____

Documentation Comment Form

National Instruments encourages you to comment on the documentation supplied with our products. This information helps us provide quality products to meet your needs.

Title: *Getting Started with Your PXI-GPIB or PMC-GPIB and the GPIB Software for Windows NT*

Edition Date: January 1998

Part Number: 321384B-01

Please comment on the completeness, clarity, and organization of the manual.

_____

_____

_____

_____

_____

_____

_____

If you find errors in the manual, please record the page numbers and describe the errors.

_____

_____

_____

_____

_____

_____

_____

Thank you for your help.

Name _____

Title _____

Company _____

Address _____

_____

E-Mail Address _____

Phone (___) _____ Fax (___) _____

Mail to: Technical Publications
National Instruments Corporation
6504 Bridge Point Parkway
Austin, Texas 78730-5039

Fax to: Technical Publications
National Instruments Corporation
512 794 5678

Glossary

Prefix	Meanings	Value
m-	milli-	10^{-3}
M-	mega-	10^{6}

°	degrees
%	percent
A	amperes
ANSI	American National Standards Institute
ASIC	application-specific integrated circuit
C	Celsius
DIP	dual inline package
DMA	direct memory access
EMI	electromagnetic interference
FCC	Federal Communications Commission
GPIB	General Purpose Interface Bus
Hz	hertz
IEEE	Institute of Electrical and Electronic Engineers
in.	inches
I/O	input/output
ISA	Industry Standard Architecture

kernel	set of programs in an operating system that implements basic system functions
m	meters
MB	megabytes of memory
PC	personal computer
RAM	random-access memory
s	seconds
VDC	volts direct current
W	Watts